Original article

Prevalence of *Chlamydia trachomatis* in young men in north west London

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Background: *Chlamydia trachomatis* is the most common, treatable, bacterial sexually transmitted infection in England and Wales. Among men, chlamydial infection is an important cause of non-gonococcal urethritis, epididymitis, and proctitis. The case for wider screening among women has been accepted by an expert advisory group. In the absence of estimates of the prevalence of infection in men, its potential impact at the population level is difficult to assess.
Objective: To estimate the prevalence of *Chlamydia trachomatis* in young men in clinic and community based samples in north west London.
Method: Cross sectional survey in healthcare centres and general practices in north west London. 1002 males aged 18–35 years, living in north west London, were recruited by staff in occupational health departments, general practices, student health services, and a "well man" clinic and by postal recruitment in four GP practices. The men were tested for *C trachomatis* using the ligase chain reaction assay on urine samples. The main outcome measure was prevalence of *C trachomatis* infection in men aged 18–35 years.
Results: The overall response rate was 51%. Prevalence of confirmed infection was 1.9% (95% CI: 1.14% to 2.96%) in all men. Best estimated minimum prevalence of infection was 1% (95% CI: 0.58% to 1.50%). Estimated prevalence was highest among men aged over 30 years.
Conclusions: The estimated prevalence among men is commensurate with that described for female populations in London. The results suggest that recruitment of men to screening programmes would be difficult. However, a higher proportion of chlamydial infection may be detected in men than in women by existing approaches to control through genitourinary medicine clinic based case finding and contact tracing. Screening of young women and the contact tracing of the male partners of positive females may be an efficient approach to improving chlamydia control.
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Introduction

Chlamydia trachomatis is the most common, treatable, bacterial sexually transmitted infection in England and Wales.[1] Its prevalence among UK women attending community based healthcare facilities is estimated to be between 2% and 12%, with the highest rates among women under 20 years of age.[2–6] Chlamydial prevalence has been estimated at 12% in sexually active adolescent males in Philadelphia,[7] 7% in males in New York,[8] and 7% in military personnel in the United States.[9] However, little information exists describing the prevalence of *C trachomatis* among UK men.

C trachomatis infection is usually asymptomatic, in both men and women, but the sequelae may be serious. It is the most common cause of pelvic inflammatory disease (PID),[10] which is estimated to follow at least 10% of untreated genital chlamydial infections.[11] Furthermore, research suggests that between 6% and 21% of women with PID will develop tubal infertility,[12] 18%–24% will experience chronic pelvic pain,[13] and an estimated 7%–9% who subsequently become pregnant will have an ectopic pregnancy.[10] In men, chlamydial infection is an important cause of non-gonococcal urethritis, epididymitis, and proctitis.[14 15]

Currently, control of genital chlamydial infection in the United Kingdom relies on case finding, diagnosis of symptomatic people, and contact tracing, largely carried out by genitourinary medicine (GUM) clinics. However, it is likely that this approach detects only a minority of prevalent infections in the community,[16] and therefore has little impact on infection and sequelae in the population. The case for wider screening among women has been accepted by an expert advisory group, reporting to the chief medical officer,[17] and pilot schemes to assess the feasibility of screening young women outside GUM clinic settings (with contact tracing of positives) are currently being evaluated in Portsmouth and the Wirral. Given the lack of prevalence data among men, and anticipated problems in gaining access to this group, the expert advisory group considered that extended screening among men could not for the present be recommended. The group did note that the high prevalence of chlamydia among traced male contacts of positive women suggested that contact tracing would be an efficient strategy to identify infected males in the population.[18] These new initiatives have been made possible by the introduction of more sensitive DNA amplification tests which can be used on urine and vaginal swab

specimens, thus avoiding the need for speculum examination.[19] However, in the absence of estimates of chlamydia prevalence in men, the potential impact at the population level of wider screening is difficult to assess.

The current study was designed to explore the effectiveness of different approaches in recruiting young men in the community in north west London, and to determine the prevalence of *C trachomatis* in young men in this location.

Subjects and methods

Between November 1995 and December 1997, 1002 men aged 18–35 years were recruited (a) through occupational health departments, student health centres, or general practitioner (GP) surgeries, and (b) by mailout of urine containers to men listed on the age-sex registers of selected GPs.

CLINIC BASED RECRUITMENT

The largest 18 GP practices in the area were approached and nine agreed to participate in the study. Five occupational health departments, two university student health centres, and one "well man" clinic, all in north west London, also agreed to participate. Personnel records were used to identify male employees aged 18–35 years in one private company, who were invited to attend dedicated screening sessions. Clinic staff recruited men before or during clinic attendance for other conditions. Informed consent was obtained and a first pass urine specimen was collected. All participants completed a confidential, self administered questionnaire to elicit sociodemographic and sexual behavioural information and urogenital symptoms. Refusals to participate were recorded to calculate response rates.

POSTAL RECRUITMENT

Two GP practices serving populations with low Jarman deprivation indices (UPA<20) and two serving populations with high deprivation scores (UPA>35) participated. All men aged 18–24 years listed on practice registers and random samples of men aged 25–35 years were invited to participate. Men were posted an invitation to participate, a consent form, a urine bottle, a prepaid envelope for return of the sample, and an information sheet. They were asked to return a sample and signed consent form, or to return the bottle if they did not wish to participate. If there was no response after 3 weeks, a reminder was sent by recorded delivery. If study packs were returned undelivered, men were recorded as not being at that address and excluded.

SPECIMEN PROCESSING AND CLINICAL MANAGEMENT

Ten ml of first pass urine were obtained from all subjects. Samples obtained in clinics were refrigerated immediately (4°C), and then transported to the laboratory and frozen at −20°C. Samples posted to the laboratory were immediately frozen at −20°C on receipt. The ligase chain reaction (LCR) assays (Abbott) were performed (according to the manufacturer's instructions) at the Jefferiss Research Trust Laboratories, St Mary's Hospital, Paddington. Confirmatory direct fluorescent antibody (MicroTrak; Behring Diagnostics) testing was performed on all LCR positive samples; a single fluorescing elementary body was considered to indicate a positive result. All laboratory tests were performed by one of the authors (BT).

All participants were sent the result of their LCR test. Men who were *C trachomatis* positive were referred to a local GUM clinic for treatment and counselling.

ANALYSIS

Study data were entered into a computerised database and analysed using the STATA statistical software package (Stata Corp, College Station, Texas).

Results

The response rates and chlamydia prevalence estimates in the samples are shown in table 1, by method of recruitment. In the clinics, 586 (55.3%) of 1060 men invited agreed to participate. In the postal study, 416 (45.3%) of 919 men invited to join (excluding 679 with wrong addresses) were recruited.

Of the clinic participants, 30% were aged 18–24 years, 31% were 25–29 years, and 39% were 30–35 years. Of postal participants 31% were aged 18–24 years, 26% were aged 25–29 years, and 43% were aged 30–35 years. Seventy two per cent of the clinic sample were white, 17% black, and 7% Asian. Twenty per cent had previously attended a GUM clinic, and 92% had previously had vaginal sex. Medians and ranges of numbers of reported female partners within different time periods were: 3 months, one (0–11); 1 year, one (0–30); and 5 years, one

Table 1 Sample sizes, response rates, and prevalence of C trachomatis by recruitment method

Recruitment method	*Number of centres*	*Response rate (%) (estimated)*	*No*	*C trachomatis positive*	*C trachomatis prevalence*	*95% CI*
Clinic:						
Occupational health by invitation	1	25	81	1	1.2%	0.03–6.69
Occupational health	5	75	172	6	3.5%	1.28–7.59
General practices	9	(60)†	232	2	0.9%	0.10–3.11
University student health services	2	85	78	0	0.0%	0.00–4.62
"Well man" clinic	1	75	23	1	4.3%	0.11–21.95
Total	18	55	586	10	1.7%	0.82–3.14
Postal:						
Low deprivation GP	2	44	192	8	4.2%	1.80–8.21
High deprivation GP	2	46	224	1	0.4%	0.01–2.49
Total	4	45	416	9	2.2%	0.99–4.11
Grand total	22	51	1002	19	1.9%	1.14–2.96

†GP surgeries varied in their completeness of collection of refusal data; response rates are therefore best estimates.

Table 2 Relation between age distribution of respondents by recruitment method and prevalence of C trachomatis

	% (number/total) of men with a positive result and 95% confidence intervals					
Age group	*Clinic based*	*95% CI*	*Postal*	*95% CI*	*Total*	*95% CI*
18–24	0.0% (0/174)	0.00–2.12	1.5% (2/130)	0.19–5.56	0.7% (2/304)	0.08–2.38
25–29	2.2% (4/181)	0.60–5.66	0.0% (0/108)	0.00–3.42	1.4% (4/289)	0.38–3.54
30–35	2.6% (6/231)	0.95–5.65	3.9% (7/178)	1.58–8.10	3.2% (13/409)	1.69–5.43
Total	1.7% (10/586)	0.82–3.14	2.2% (9/416)	0.99–4.11	1.9% (19/1002)	1.14–2.96

(0–200). Six per cent reported anal intercourse with a man at some time in the past.

Ten (1.7%) of the 586 clinic recruited men were *C trachomatis* positive (eight white, two black African), the highest prevalence being among men recruited from occupational health centres and the well man clinic. Nine (2.2%) of the 416 men recruited through the postal survey were positive; eight of these were registered with GPs in areas with low deprivation scores. The overall prevalence of *C trachomatis* in clinic and postal recruits was 19 of 1002 (1.9%; 95% CI: 1.14% to 2.96%).

The highest chlamydial prevalence for clinic and postal recruits was in men aged 30–35 years (table 2). No chlamydial infection was detected in 18–24 year old men recruited from the clinics, of whom at least 51% were university students.

Two of the men with chlamydial infection reported experiencing symptoms of urethral discharge before they were tested but neither had discharge on examination. A further two of 13 men who attended a GUM clinic after diagnosis reported symptoms at attendance, and both showed signs of infection.

Discussion

Our finding that the overall prevalence of *C trachomatis* in young men was 1.9% is consistent with a previously reported prevalence of 2.6% among women in general practices in north east London.[4] It should be noted that our findings do not exclude a higher prevalence rate in sexually active males under 18 years old. Moreover, urines were obtained from only about half of the men invited to participate, and those at high risk may have been less likely to contact clinical services, or to consent to participation, or to respond to postal recruitment. However, distributions of numbers of sexual partners and prevalence of anal sex among the clinic recruited sample were commensurate with those reported in the Greater London sample of men recruited to the National Survey of Sexual Attitudes and Lifestyles (NATSSAL). The proportions in our study sample who had attended a GUM clinic (20%) were higher than proportions reported in NATSSAL (7%). Forty five per cent of recorded delivery letters were returned undelivered, which is consistent with the high levels of so called "ghost patients" on GP lists reported elsewhere in the United Kingdom.[20] Postal respondents may therefore have been men who were less mobile, with, possibly, lower risk sexual lifestyles. In addition, a small reduction in the number of positive urines may have resulted from an incomplete cold chain before LCR assay.

A higher chlamydial prevalence was anticipated among men aged below 30 years, in accordance with findings reported previously from community based samples of females in London.[4] However, half of the men in the 18–24 year age group recruited from clinics were university students, and this is unrepresentative of the 18–24 year old population in the area as a whole.

Despite these potential biases our findings allow calculation of unbiased *minimum* estimates of the prevalence of chlamydial infection in young men if we assume that all those invited to participate, but not recruited, were not infected. The inclusion of non-respondents in the denominator gives estimates of the prevalence of chlamydial infection of approximately 1% (95% CI: 0.58% to 1.50%) among both clinic recruited men (10/1060) and men recruited through postal invitation (9/919).

Comparison of these prevalence rates with the rates of *C trachomatis* and non-gonococcal urethritis in GUM clinics in Greater London contributing to the STI Surveillance and Commissioning Intelligence System[21] is informative. We calculated numbers of men and women aged 15–44 attending at GU clinics in Greater London (north of the Thames) and constructed denominators from population estimates from the Office for National Statistics. In 1998, the rate of detection of new cases of chlamydial infection in men aged 15–44 years was 0.21% and for non-gonococcal urethritis (NGU) 0.98%. A further 0.08% were treated epidemiologically because of chlamydia in their sexual partners. If 50% of NGU is assumed to be caused by *C trachomatis*, then just under 0.8% of males aged between 15 and 44 years may be treated for chlamydial infection each year in north Greater London. If our prevalence estimates in this study are correct and the average duration of infection is not greater than 1 year, then this represents, at best, one man treated for every 2.5 infected each year. Similarly, 0.26% of women aged 15 to 44 years were treated for diagnosed *C trachomatis*, and 0.11% were treated epidemiologically as their sexual partners had chlamydial infection, and 0.27% because their sex partners had NGU. Thus, assuming again that 50% of NGU is caused by chlamydial infection, approximately 0.5% of females aged between 15 and 44 years may be treated for *C trachomatis* each year in the region. Assuming a prevalence of 5% in women[17] and an average duration of infection of no greater than 1 year, this represents, at best, approximately one woman treated for every 10 infected each year.

These calculations together with our findings suggest that a substantial proportion of

chlamydial infections in young men are detected through existing mechanisms, although our ignorance of the average period for which young men are infected makes interpretation difficult. Our findings further suggest that recruitment of young men into screening programmes may be difficult. Therefore, the proposed screening strategy based upon opportunistic testing of young women attending healthcare facilities, combined with contact tracing of the male partners of positive women, may be the most effective and practical. However, the above calculations also suggest that, in 1998, only three male contacts were treated epidemiologically for every 10 women diagnosed with chlamydial infection. The effectiveness of contact tracing will need to be improved if the recommended screening policy is to prevent women becoming reinfected after treatment, or to make significant impact on the prevalence of *C trachomatis* among young people.

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Contributors: TP carried out the field work for the study and the data collection, and she and AJ conducted the analysis and prepared the first draft of the paper; BT and DTR participated in the study design, managed and contributed to the analysis and writing of the paper. BT carried out the laboratory studies; RB contributed to the management of the fieldwork and to the writing of the paper; AR initiated and developed the core ideas and study design and oversaw its execution. He contributed to the data analysis and writing of the paper and is the guarantor of the study.

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Conflict of interest: None.

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